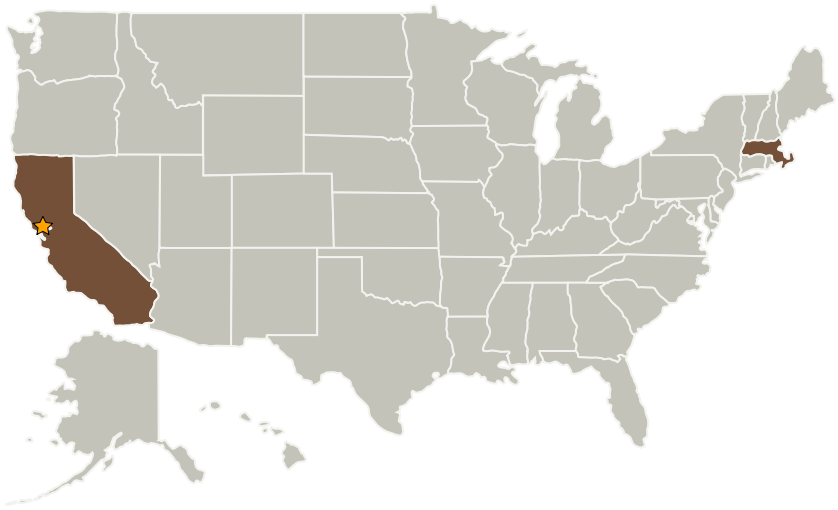
High-Fidelity Kinetics and Radiation Transport for NLTE Hypersonic Flows, Phase I

Completed Technology Project (2007 - 2007)

Project Introduction

The modeling of NLTE hypersonic flows combines several disciplines: chemistry, kinetics, radiation transport, fluid mechanics, and surface science. No single code or model has been able to capture, with high fidelity, all the complex effects that come into play, especially at higher velocities. Spectral Sciences, Inc. proposes to create an innovative software tool to develop and demonstrate high-fidelity chemistry, radiation, and flow models for NLTE hypersonic flows that will address all the important effects in a unified way. SSI will demonstrate an end-to-end capability to simulate the kinetics and radiation transport for NLTE hypersonic flows through the development of prototype software and demonstration for a candidate hypersonic flow scenario. The software will be designed to be modular, in order that they can be used by other codes and other applications. Testing and validation will include studies of the interaction of gases in the shock layer with the ablating material making up the thermal protection system of the vehicle as well as an assessment of other available codes. It is intended that the software tool be used as a benchmark to test lower-fidelity models, or as an inexpensive substitute for laboratory or field tests.

Primary U.S. Work Locations and Key Partners



High-Fidelity Kinetics and Radiation Transport for NLTE Hypersonic Flows, Phase I

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

High-Fidelity Kinetics and Radiation Transport for NLTE Hypersonic Flows, Phase I

Completed Technology Project (2007 - 2007)

Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Spectral Sciences, Inc.	Supporting Organization	Industry	Burlington, Massachusetts

Primary U.S. Work Locations	
California	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.4 Vehicle Systems
    - TX09.4.5 Modeling and Simulation for EDL